CLAIMS

1. A semiconductor device comprising:

a substrate in which a plurality of through holes are formed;

an interconnect pattern formed on the substrate and passing over the through holes;

a first plating layer formed on the interconnect pattern surface opposite to the substrate;

a second plating layer formed on the interconnect pattern surface looking toward the substrate in the through holes;

a semiconductor chip mounted on the substrate and electrically connected to the first plating layer;

a resin provided on the first plating layer; and

a conductive material provided on the second plating layer,

wherein the first and second plating layers have different properties.

2. A semiconductor device comprising:

a substrate;

a first interconnect pattern formed on one surface of the substrate;

a second interconnect pattern formed on the other surface of the substrate and electrically connected to the first interconnect pattern;

a first plating layer formed on the first interconnect

pattern surface opposite to the substrate;

a second plating layer formed on the second interconnect pattern surface opposite to the substrate;

a semiconductor chip mounted on the substrate and electrically connected to the first plating layer;

a resin provided on the first plating layer; and

a conductive material provided on the second plating layer,

wherein the first and second plating layers have different properties.

3. A semiconductor device comprising:

a substrate;

an interconnect pattern formed on the substrate;

a first plating layer formed on a first portion of the interconnect pattern surface opposite to the substrate;

a second plating layer formed on a second portion of the interconnect pattern surface opposite to the substrate;

a resin provided on the first plating layer;

a conductive material provided on the second plating layer; and

a semiconductor chip mounted on the substrate and electrically connected to the conductive material,

wherein the first and second plating layers have different properties.

4. The semiconductor device as defined in claim 1,

wherein the first plating layer is formed to be thinner than the second plating layer.

5. The semiconductor device as defined in claim 2, wherein the first plating layer is formed to be thinner than the second plating layer.

6. The semiconductor device as defined in claim 3, wherein the first plating layer is formed to be thinner than the second plating layer.

7. The semiconductor device as defined in claim 1, wherein the first and second plating layers are formed of different materials.

8. The semiconductor device as defined in claim 2, wherein the first and second plating layers are formed of different materials.

9. The semiconductor device as defined in claim 3, wherein the first and second plating layers are formed of different materials.

10. The semiconductor device as defined in claim 1, wherein the resin is an adhesive, and includes conductive particles to constitute an anisotropic conductive material; and wherein the semiconductor chip is mounted by face-down

bonding with the anisotropic conductive material interposed.

11. The semiconductor device as defined in claim 2, wherein the resin is an adhesive, and includes conductive particles, to constitute an anisotropic conductive material; and

wherein the semiconductor chip is mounted by face-down bonding with the anisotropic conductive material interposed.

12. The semiconductor device as defined in claim 3, wherein the resin is an adhesive, and includes conductive particles, to constitute an anisotropic conductive material; and

wherein the semiconductor chip is mounted by face-down bonding with the anisotropic conductive material interposed.

13. A mounting substrate comprising:

a substrate in which a plurality of through holes are formed;

an interconnect pattern formed on the substrate and passing over the through holes;

a first plating layer formed on the interconnect pattern surface opposite to the substrate; and

a second plating layer formed on the interconnect pattern surface looking toward the substrate in the through holes,

wherein the first and second plating layers have different properties.

14. A mounting substrate comprising:

a substrate;

a first interconnect pattern formed on one surface of the substrate;

a second interconnect pattern formed on the other surface of the substrate and electrically connected to the first interconnect pattern;

a first plating layer formed on the first interconnect pattern surface opposite to the substrate; and

a second plating layer formed on the second interconnect pattern surface opposite to the substrate,

wherein the first and second plating layers have different properties.

15. A mounting substrate comprising:

a substrate;

an interconnect pattern formed on the substrate;

a first plating layer formed on a first portion of the interconnect pattern surface opposite to the substrate; and

a second plating layer formed on a second portion of the interconnect pattern surface opposite to the substrate,

wherein the first and second plating layers have different properties.

16. The mounting substrate as defined in claim 13,

wherein the first plating layer is formed to be thinner

than the second plating layer.

17. The mounting substrate as defined in claim 14, wherein the first plating layer is formed to be thinner than the second plating layer.

18. The mounting substrate as defined in claim 15, wherein the first plating layer is formed to be thinner than the second plating layer.

19. The mounting substrate as defined in claim 13, wherein the first and second plating layers are formed of different materials.

20. The mounting substrate as defined in claim 14, wherein the first and second plating layers are formed of different materials.

21. The mounting substrate as defined in claim 15, wherein the first and second plating layers are formed of different materials.

22. A circuit board on which is mounted the semiconductor device as defined in any of claims 1, ~~4, 7, and 10.~~

23. A circuit board on which is mounted the semiconductor device as defined in any of claims 2, ~~5, 8, and 11.~~

24. A circuit board on which is mounted the semiconductor device as defined in any of claims 3, ~~6, 9, and 12.~~

25. An electronic instrument equipped with the semiconductor device as defined in any of claims 1, ~~4, 7, and 10.~~

26. An electronic instrument equipped with the semiconductor device as defined in any of claims 2, ~~5, 8, and 11.~~

27. An electronic instrument equipped with the semiconductor device as defined in any of claims 3, ~~6, 9, and 12.~~

28. A method of manufacturing a mounting substrate, comprising the steps of:

immersing a substrate in a plating bath, the substrate having a plurality of through holes and an interconnect pattern formed thereon and passsing over the through holes;

electrically connecting the interconnect pattern to a cathode;

disposing a first anode to face the surface of the substrate on which the interconnect pattern is formed;

disposing a second anode to face the surface of the substrate opposite to the interconnect pattern; and

passing currents of different current densities between the first and second anodes and the cathode,

wherein a first plating layer is formed on the

interconnect pattern by the current from the first anode; and

wherein a second plating layer is formed on the interconnect pattern on the side of the substrate and within the through holes by the current from the second anode.

29. A method of manufacturing a mounting substrate, comprising the steps of:

immersing a substrate in a first plating bath, the substrate having a plurality of through holes and an interconnect pattern formed thereon and passing over the through holes;

electrically connecting the interconnect pattern to a cathode;

forming a first plating layer on the interconnect pattern by disposing a first anode to face the surface of the substrate on which the interconnect pattern is formed and carrying out electroplating;

immersing the substrate in a second plating bath;

electrically connecting the interconnect pattern to a cathode; and

forming a second plating layer on the interconnect pattern surface looking toward the substrate in the through holes by disposing a second anode to face the surface of the substrate opposite to the interconnect pattern and carrying out electroplating.

30. A method of manufacturing a mounting substrate,

comprising the steps of:

forming a plurality of through holes and an interconnect pattern passing over the through holes on a substrate;

forming a first plating layer by covering the through holes with a first resist and applying electroless plating to the interconnect pattern; and

forming a second plating layer by exposing a portion of the interconnect pattern in the through holes, covering the surface of the interconnect pattern opposite to the substrate with a second resist, and applying electroless plating to the interconnect pattern in the through holes.

31. A method of manufacturing a mounting substrate, comprising the steps of:

immersing a substrate in a plating bath, wherein the substrate has a first interconnect pattern formed on one surface and a second interconnect pattern electrically connected to the first interconnect pattern and formed on the other surface;

electrically connecting the first and second interconnect patterns to a cathode;

disposing a first anode to face the first interconnect pattern;

disposing a second anode to face the second interconnect pattern; and

passing currents of different current densities between the first and second anodes and the cathode,

wherein a first plating layer is formed on the first

interconnect pattern by the current from the first anode; and

wherein a second plating layer is formed on the second interconnect pattern by the current from the second anode.

32. A method of manufacturing a mounting substrate, comprising the steps of:

immersing a substrate in a first plating bath, wherein the substrate has a first interconnect pattern formed on one surface and a second interconnect pattern electrically connected to the first interconnect pattern and formed on the other surface;

electrically connecting the first interconnect pattern to a cathode;

forming a first plating layer on the first interconnect pattern, by disposing a first anode to face the first interconnect pattern and carrying out electroplating;

immersing the substrate in a second plating bath;

electrically connecting the second interconnect pattern to a cathode; and

forming a second plating layer on the second interconnect pattern, by disposing a second anode to face the second interconnect pattern and carrying out electroplating.

33. A method of manufacturing a mounting substrate, comprising the steps of:

forming a first interconnect pattern on one surface of a substrate;

forming a second interconnect pattern electrically connected to the first interconnect pattern on the other surface of the substrate;

forming a first plating layer by covering the second interconnect pattern with a first resist and applying electroless plating to the first interconnect pattern; and

forming a second plating layer by covering the first interconnect pattern with a second resist and applying electroless plating to the second interconnect pattern.

34. A method of manufacturing a mounting substrate, comprising the steps of:

forming an interconnect pattern on a substrate;

forming a first plating layer on a first portion of the interconnect pattern by covering a second portion of the interconnect pattern with a resist and exposing the first portion, and applying electroless plating to the interconnect pattern; and

forming a second plating layer in the second portion by covering the first portion with a resist and exposing the second portion, and applying electroless plating to the interconnect pattern.

35. The method of manufacturing a mounting substrate as defined in claim 28,

wherein the first and second plating layers have different properties.

36. The method of manufacturing a mounting substrate as defined in of claim 29,

wherein the first and second plating layers have different properties.

37. The method of manufacturing a mounting substrate as defined in claim 30,

wherein the first and second plating layers have different properties.

38. The method of manufacturing a mounting substrate as defined in claim 31,

wherein the first and second plating layers have different properties.

39. The method of manufacturing a mounting substrate as defined in claim 32,

wherein the first and second plating layers have different properties.

40. The method of manufacturing a mounting substrate as defined in claim 33,

wherein the first and second plating layers have different properties.

41. The method of manufacturing a mounting substrate as

defined in claim 34,

wherein the first and second plating layers have different properties.

42. The method of manufacturing a mounting substrate as defined in claim 28,

wherein the first plating layer is formed to be thinner than the second plating layer.

43. The method of manufacturing a mounting substrate as defined in claim 29,

wherein the first plating layer is formed to be thinner than the second plating layer.

44. The method of manufacturing a mounting substrate as defined in claim 30,

wherein the first plating layer is formed to be thinner than the second plating layer.

45. The method of manufacturing a mounting substrate as defined in claim 31,

wherein the first plating layer is formed to be thinner than the second plating layer.

46. The method of manufacturing a mounting substrate as defined in claim 32,

wherein the first plating layer is formed to be thinner

than the second plating layer.

47. The method of manufacturing a mounting substrate as defined in claim 33,

wherein the first plating layer is formed to be thinner than the second plating layer.

48. The method of manufacturing a mounting substrate as defined in claim 34,

wherein the first plating layer is formed to be thinner than the second plating layer.

49. The method of manufacturing a mounting substrate as defined in claim 29,

wherein the first and second plating layers are formed of different materials.

50. The method of manufacturing a mounting substrate as defined in claim 30,

wherein the first and second plating layers are formed of different materials.

51. The method of manufacturing a mounting substrate as defined in claim 32,

wherein the first and second plating layers are formed of different materials.

52. The method of manufacturing a mounting substrate as defined in claim 33,

wherein the first and second plating layers are formed of different materials.

53. The method of manufacturing a mounting substrate as defined in claim 34,

wherein the first and second plating layers are formed of different materials.